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APIUM L. SECT. *APIUM* (UMBELLIFERAE) IN AUSTRALASIA

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Abstract

Apium in Australasia is reviewed and three species, *A. prostratum* Labill. ex Vent., *A. insulare* Short sp. nov. and *A. annuum* Short sp. nov. occur naturally in the region. A fourth species, *A. graveolens* L., the cultivated celery, occasionally occurs as a weed. *A. prostratum,* widespread throughout the region, is divided into three subspecies, ssp. *prostratum,* ssp. *howense* Short ssp. nov., restricted to Lord Howe Island, and ssp. *denticulatum* Short ssp. nov., confined to the Chatham Islands. A single collection from the Porongorup Range, Western Australia, is also tentatively regarded as representing a separate subspecies of *A. prostratum.* Two varieties of ssp. *prostratum,* namely var. *prostratum* and var. *filiforme* (A. Rich.) Kirk are distinguished. Both varieties occur in Australia and New Zealand. *A. annuum,* the only annual in the genus, is confined to Australia. *A. insulare* occurs on Lord Howe Island and islands of Bass Strait. *A. australe* Pet.-Thou., to which Australasian populations have often been referred, is not considered to occur in the region.

Introduction

Apium L. currently contains approximately twenty species, with five occurring in Europe (Tutin 1968) and most of the remaining species in South America. Australasian floristic literature commonly records four species, *A. graveolens* L. the cultivated species, the weed *A. leptophyllum* (Pers.) F. Muell. considered here to belong to the genus *Ciclospermum* Lag., and the natives *A. prostratum* Labill. ex Vent and *A. filiforme* (A. Rich) Hook. It has long been considered that the native Australian (e.g. Bentham 1876; Curtis 1963; Eichler 1965) and New Zealand (e.g. Hooker 1867; Kirk 1899; Allan 1961) populations of *Apium* exhibit a great diversity of form. This paper is an attempt to provide a workable and nomenclaturally correct classification of the populations of *Apium* that occur in Australia, New Zealand and neighbouring islands.

History

A. *Generic History*

Linnaeus (1753) in his 'Species Plantarum' described two species of *Apium, A. petroselinum* (= *Petroselinum crispum*) and *A. graveolens,* and subsequently described the genus in his 'Genera Plantarum' (1754). Since the time of Linnaeus the genus *Apium* has been variously defined and sub-divided by De Candolle (1830), Bentham (1867a), Drude (1898) and Wolff (1927). The most recent comprehensive world-wide treatment of *Apium* is that by Wolff (l.c.), who recognized 5 sections; sect. *Apium* containing, among others, *A. prostratum* Labill. ex Vent., *A. filiforme* (A. Rich.) Hook and *A. graveolens* L., sect. *Ciclospermum** (Lag.) Wolff which contained all annual species, sect. *Mauchartia* (DC.) Benth. sect. *Oreosciadium* DC. and sect. *Apodicarpum* (Makino) Wolff.

Since Wolff's 1927 revision of *Apium* the generic limits of the taxon have been revised by several workers.

Mathias & Constance (1951) transferred all members of sect. *Oreosciadium* DC. to the genus *Niphogeton* Schldl. This genus is restricted to the Andes of South America.

* Wolff and other past workers have used the spelling *Cyclospermum* but the original spelling as used by Lagasca (1821, n.v., fide Index Nominum Genericorum) is *Ciclospermum* and this should be retained. It could be argued that the spelling *Cyclospermum* is justified as Lewis & Short (1962) use the spelling cyclas in their classical Latin dictionary and, furthermore, article 73, note 2, of the International Code of Botanical Nomenclature (Stafleu et al. 1972) does say that the consonant y is permissible in Latin plant names. However, the same article also states that "the liberty of correcting a name is to be used with reserve, especially if the change affects the first syllable and, above all, the first letter of the name".

MacBride (1930, n.v., fide Mathias & Constance (1951)) also felt that sect. *Helosciadium (= Mauchartia)* may, from a genetic standpoint, be closely related to *Sium* L. and perhaps should be given generic status. However, there appears to have been no further investigation of this question.

Hiroe & Constance (1958), Mathias & Constance (1962) and Ohwi (1965) also regard sect. *Apodicarpum* (Makino) Wolff as being generically distinct. *Apodicarpum* Makino is a monotypic genus endemic to Japan.

In 1962 Mathias & Constance recognized a need for revision of section *Ciclospermum* (Lag.) DC. and suggested that this variable group of annuals could be given generic status. Cerceau-Larrival (1964), primarily on the basis of pollen and cotyledon characters and different chromosome numbers (n = 7 in *A. leptophyllum*, n = 11 in species belonging to other sections of *Apium*) placed *A. leptophyllum* in the genus *Ciclospermum* Lag. She makes no mention of the placement of the other South American annuals, *A. laciniatum* (DC.) Urban and *A. uruguayense* Mathias & Constance, but since they have previously been included in sect. *Ciclospermum* (Lag.) DC. by Wolff (l.c.) and Mathias & Constance (1962), they may be found to belong to *Ciclospermum* as suggested by a haploid chromosome number of n = 7 found in *A. laciniatum* (Bell & Constance 1957).

Surprisingly, despite Cerceau-Larrivale's placement of the annual species in *Ciclospermum* and previous suggestion of this action by Mathias & Constance (1962), Constance, Chuang & Bell (1976) still included *Ciclospermum leptophyllum* (Pers.) Sprague in *Apium*.

For the purposes of this investigation of *Apium* in Australia I have accepted the recent modifications proposed to Wolff's 1927 system. Thus sect. *Apium* and sect. *Mauchartia* [DC.] Benth are the only two sections which I recognize within *Apium*. The Australian species *A. prostratum* and the cultivated celery *A. graveolens* belong to section *Apium*, while the weed *A. leptophyllum* is treated as belonging to the genus *Ciclospermum*.

B. *Taxonomic History of Native Australasian Species*

Ventenat (1804-5) first described the species *A. prostratum* Labill. ex Vent. in the "Jardin de la Malmaison". He applied the name previously published as a nomen nudum by Labillardiere (1800). Several years later Du Petit-Thouars (1808-11) described the species *A. australe* in the "Esquisse de la flore de l'Isle de Tristan d'Acugna". Many of the Australasian floras (Black 1962; Allan 1961) and Wolff (1927) do in fact cite the publication date of *A. australe* as 1804 and this name has often been considered to be nomenclaturally correct by workers who believed the two species *A. prostratum* and *A. australe* to be conspecific. Stafleu (1967), and Stafleu & Cowan (1976), however, cite the correct publication date for the "Esquisse" as being 1808, the paper being reprinted or re-issued in 1811. Dr. A. Kanis (pers.comm.1976, then Australian Botanical Liaison Officer at Kew) has, apart from an unsupported reference by van Steenis-Kruseman (1964) which was referred to by Stafleu (l.c.), and Stafleu & Cowan (l.c.), found no evidence that there was an edition of this paper in 1808. Kanis considered that if there was an 1808 edition then the 1811 edition was likely to be verbatim.

While *A. australe* has been considered by most workers to be the same as *A. prostratum*, others (e.g. Eichler 1965) have expressed doubt that this is indeed so. Irrespective of whether *A. prostratum* and *A. australe* are conspecific the correct name for the Australian species, because of its prior date of publication, is *A. prostratum*.

Robert Brown, in an unpublished manuscript of his Australian collections, described *A. prostratum* from collections made in December 1801 from King George III Sound, Western Australia. On the basis of leaf type he recognized two varieties, one with 3-4 pinnatifid cauline leaves with linear undivided segments and the other with leaves with linear-oblong or entirely oblong "pinnules". Other workers, (e.g. Bentham 1867b; Hooker 1856), were also well aware of the variation in leaflet shape exhibited by *A. prostratum* and in 1927 Wolff

formally divided *A. prostratum* into two varieties, var. *latisectum* Wolff possessing leaflets with broadly obovate or cuneate segments, and var. *angustisectum* Wolff, having leaflets with linear or lanceolate segments. The former variety was considered to occur in South America, Australia, New Zealand and Lord Howe Island, the latter in Australia and New Zealand. In 1929 Domin, without referring to Wolff's revision also distinguished two varieties of *A. prostratum,* namely var. *filiforme* (A. Rich.) Kirk (see below) and var. *maritimum* Domin. The latter variety was described from Australia and contained plants with obovate or obcuneate segments and more robust stems than those occurring in var. *filiforme.*

In 1832 Richard described the species *Petroselinum filiforme* from New Zealand. W.J. Hooker (1851) transferred *P. filiforme* to *Apium* and recognized two varieties, var. α with leaflets having lobes cut deeply and sharply, and var. β *trifidum* Hook. with less slender stems and entire leaflets lobes. However, in 1852 J.D. Hooker, although considering *A. filiforme* (A. Rich.) Hook. as a species, stated that this name applied to (p.87) "a much smaller and more slender plant than *A. australe* (= *A. prostratum*), of which I believe it to be probably a state, growing in rocky places, with smaller and less divided leaves". Kirk (1899) reduced *A. filiforme* to a variety of *A. prostratum* and this rank was also accepted by Cheeseman (1906). On the other hand both Wolff (1927) and Allan (1961) regarded *A. filiforme* as a distinct species.

Finally there are some unpublished records of interest. As stated above Robert Brown, in his unpublished manuscript, described the species *A. prostratum.* In the same manuscript, from collections made in December 1803 from the Kent's Island Group in Bass Strait, he described and named a species that differs from *A. prostratum* in leaf and floral characters. A Robert Brown collection from Bass Strait, housed in the National Herbarium of Victoria (MEL 503673), is of a single individual with a large erect stem and very large pedunculate compound umbel. (This specimen is referrable to the new species, *A. insulare* Short).

An examination of material housed in Kew and the National Herbarium of Victoria has shown that Ferdinand von Mueller gave unpublished varietal names to collections of annual plants which he considered to belong to *A. prostratum.* According to unpublished herbarium annotations, lists and correspondence, Dr Hj. Eichler (pers.comm.) has also recognized an annual *Apium* in South Australia as an undescribed species allied to *A. prostratum.* (These annual specimens of *Apium* are referrable to the new species, *A. annuum* Short).

Morphology

A. *Terminology*

Throughout this paper Stearn (1973) has been the major source of terminology, especially with respect to terms used to define leaf characters other than shape. For leaf shape the terms put forward by the Systematics Association Committee for Descriptive Terminology (1962) have been applied. Murley (1946) provided a glossary of terms used in describing fruit structures of the Umbelliferae and this has been followed.

B. *Techniques*

Chromosome counts of *A. annuum* were obtained by taking root tips from freshly germinated seeds (*Short 206*) and fixing them in a mixture of 3 parts ethanol: 1 part glacial acetic acid for two hours. Following this they were hydrolysed in 10% hydrochloric acid at 25°C for 15-20 minutes before being squashed and stained with aceto-orcein.

C. *Characters*

1. *Life Span and Habit*

A. annuum is a small (3-10 cm tall) annual that completes its life cycle in 3-4 months. Both *A. prostratum* and *A. insulare* are biennial or perennial species. *A. prostratum* is a large prostrate plant that may root at the nodes while *A. insulare* possesses a large, erect stem.

2. *Cotyledons*

A study of seedling morphology by Cerceau-Larrival (1971) has shown that in the Umbelliferae it is possible to distinguish 2 major types of cotyledons:

(a) Long (L) type- in which the lamina almost imperceptibly grades into a petiole
(b) Round (R) type- in which the lamina abruptly narrows into a petiole

In 1964 Cerceau-Larrival made use of this character when distinguishing between the genera *Apium*, with round cotyledons and consisting at that stage only of perennials, and *Ciclospermum*, characterized by long cotyledons and comprising solely annuals. The newly described annual, *A. annuum*, possesses the round cotyledons of *Apium*, supporting its placement in that genus. No differences were found to occur between the Australian native species in cotyledon characters.

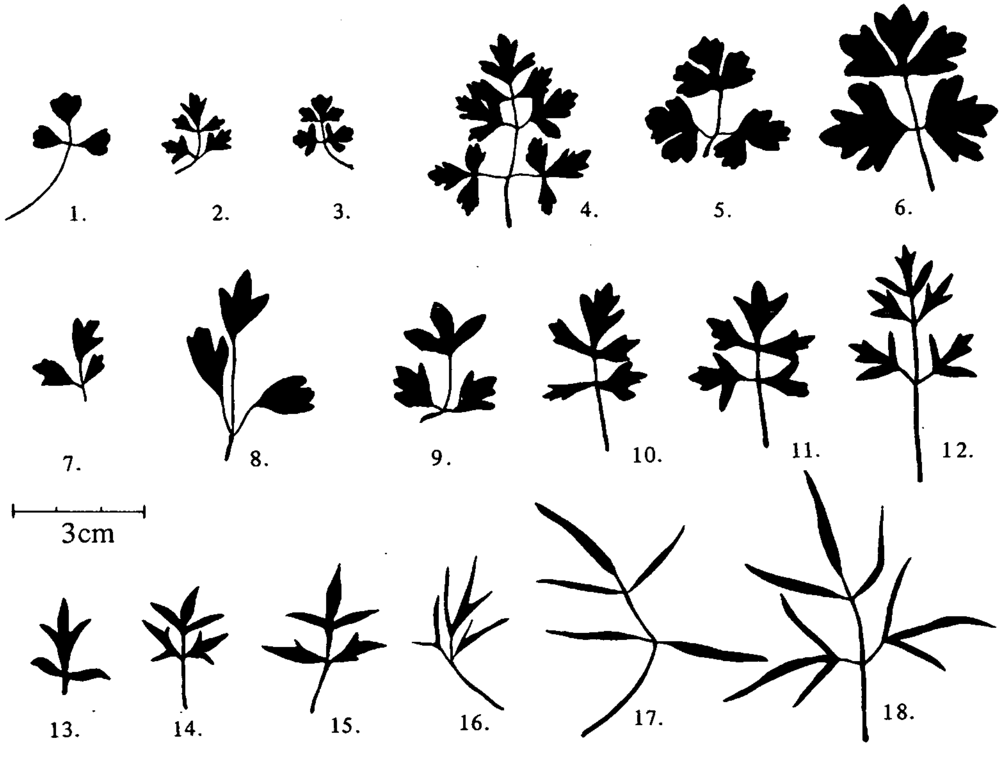


Fig. 1. *Apium prostratum* Labill. ex Vent. ssp. *prostratum*, variation exhibited in leaves opposite mature umbels; var. *filiforme* (A. Rich.) Kirk: 1, *Moore s.n.*, Cowan's Bay, Rodney County, New Zealand, 4.i.1962 (CHR 125562); 2-4, *Short 138*, Cape Lannes sand-dunes, South Australia, 5.iii.1976 (AD); 5, *Ritchie s.n.*, Sealers Bay, Codfish Is., off Stewart Is., 16.xii.1966 (CHR 174683); 6, *Short 82;* Port Elliot, South Australia, 17.ii.1976 (AD); 7, *Macmillan 67/5*, French Farm Bay, Akaroa Harbour, Banks Peninsula, New Zealand, 17.i.1967 (CHR); 8, *Talbot s.n.*, Rabbit Island, Tasman Bay, New Zealand, 13.xi.1962 (CHR 270576); 9, *Short 80;* Port Elliot, South Australia, 17.ii.1976 (AD); 10-11, *Short 60*, Port Elliot, South Australia, 17.ii.1976 (AD); var. *prostratum-filiforme:* 12, *Short 230*, ca. 1 km N. of Port Vincent, South Australia, 4.iv.1976 (AD); 13-15, *Short 303*, ca. 2 km S.W. of Gleeson's Landing, Yorke Pen., South Australia, 20.ii.1977 (AD); var. *prostratum:* 16, *Short 175*, Riddock Bay, South Australia, 5.iii.1976 (AD); 17, *Short 167*, Riddock Bay, South Australia, 5.iii.1976 (AD); 18, *Short 169*, Riddock Bay, South Australia, 5.iii.1976 (AD).

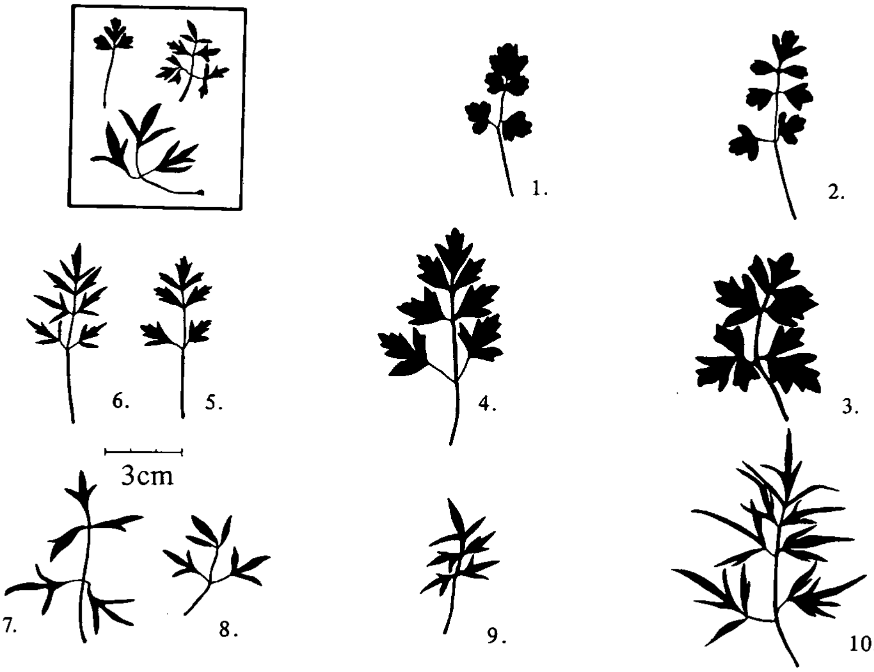


Fig. 2. *Apium prostratum* Labill. ex Vent. ssp. *prostratum*, variation exhibited in basal leaves. South Australian populations; var. *filiforme* (A. Rich.) Kirk: 1, *Short 118*, Robe sand-dunes, 5.iii.1976 (AD); 2, *Short 117*, Robe sand-dunes, 5.iii.1976 (AD); 3, *Short 81*, Port Elliot, 17.ii.1976 (AD); var. *prostratum-filiforme:* 4, *Short 214*, Port Vincent, 4.iv.1976 (AD); 5, *Short 208*, Port Vincent, 4.iv.1976 (AD); 6, *Short 303*, ca. 2 km S.W. of Gleeson's Landing, 20.ii.1977 (AD); 7, *Short 99A*, ca. 19 km N. of Policeman's Point, 4.iii.1976 (AD); 8, *Short 215*, Port Vincent, 4.iv.1976 (AD); var. *prostratum:* 9-10, *Short 171*, Riddock Bay, 5.iii.1976 (AD).

Inset: *A prostratum* Labill. ex Vent. ssp. *prostratum* var. *prostratum-filiforme*, variation exhibited in leaves opposite mature umbels of a single plant; *Short 213*, ca. 1 km N. of Port Vincent, South Australia, 4.iv.1976 (AD).

3. *Leaves*

To assist the analysis of leaf variation I have coined a number of terms to describe characters other than those outlined by Stearn (1973).

LEAFLETS (PRIMARY) — formed when a leaf is divided such that divisions extend to the petiole of the leaf.

LEAFLETS (SECONDARY) — formed when a leaflet is divided such that divisions extend to the petiolule resulting in primary segments which are in turn extensively divided.

SEGMENTS — primary: the major lobes of a leaflet — usually 3 — of approximately equal size.

secondary: the largest lobes of a primary segment — usually 3 — of approximately equal size.

tertiary: the result of divisions of secondary segments.

quaternary: the result of divisions of tertiary segments.

ULTIMATE NUMBER OF SEGMENTS — the total number of segments counting around the leaf margin, irrespective of whether they be of primary, secondary, tertiary or quaternary order.

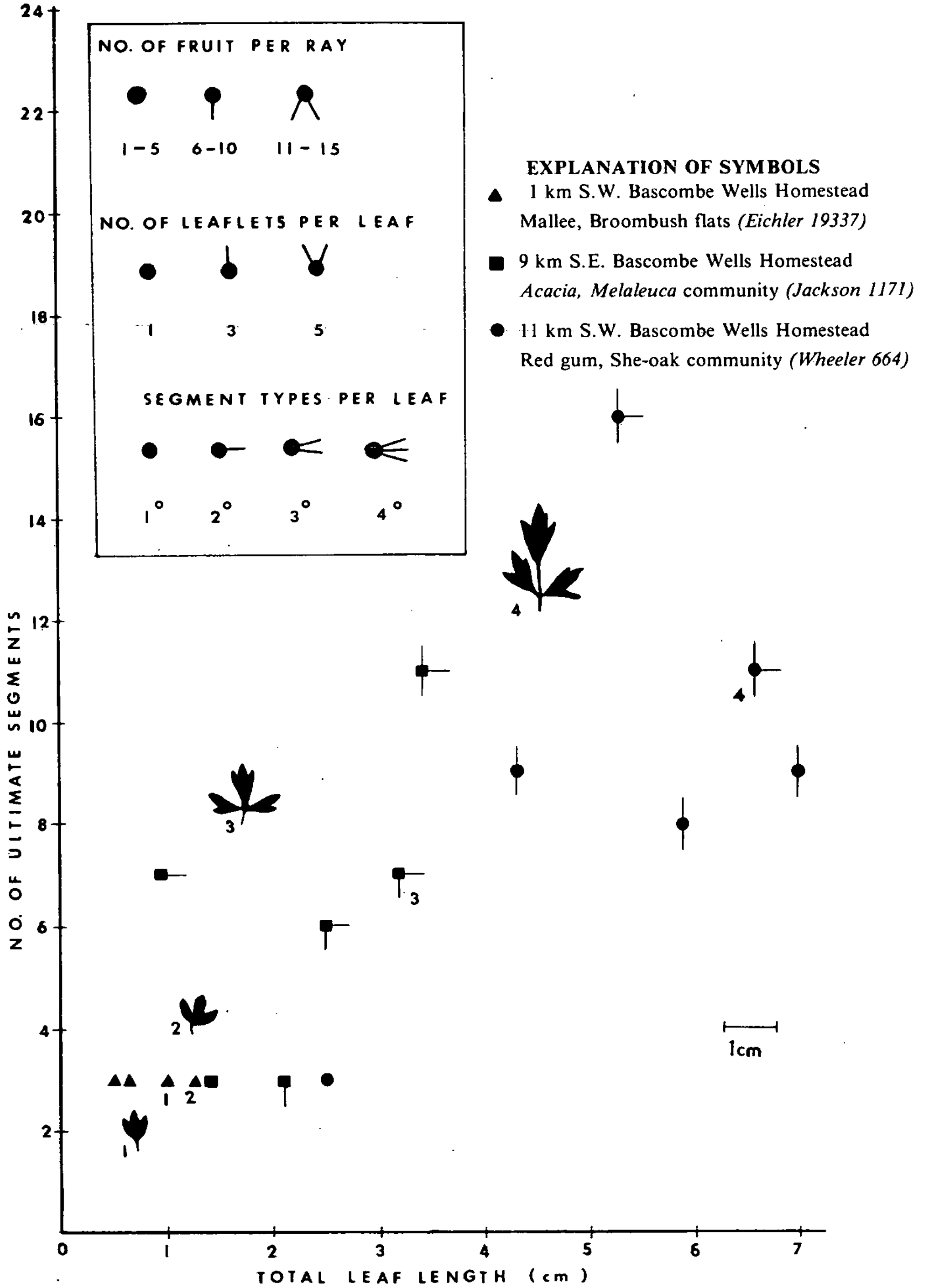


Fig. 3. Scatter diagram portraying the morphological intergradation between Hundred of Blesing (Eyre Penin.) populations of *A. annuum* Short.

A. prostratum Labill. ex Vent.

(a) ssp. *prostratum*

Investigations have shown that within individuals of *A. prostratum* ssp. *prostratum* it is usual for most basal and cauline leaves to differ from one another in the number and shape of leaflets. However, much of the apparent variations between these leaves occurs as the result of the longer persistence of the first 3-5 basal leaves, which tend to differ in shape more from the cauline leaves than from later formed basal leaves.

To enable comparisons of different plants to be made a "standard leaf", that opposite a mature umbel, was chosen. On any individual plant the shape of the leaflets and segments of this standard leaf barely differ, variation only occurring in the number of leaflets and segments per leaf. Similar variation generally occurs within any one population although I have observed a single individual (*Short 213*, Fig. 2, inset) from Port Vincent, South Australia, with quite different leaves to those normally found (Fig. 1 no. 12).

While the shape of the standard leaf is generally constant within populations and is, as indicated by growth experiments, primarily under genetic control, individuals from separate populations may exhibit differences in both shape and number of leaflets and segments (Figs 1-2). As can be seen in Figs 1 and 2 leaflet and segment shape is extremely variable and it is evident that there is a general intergradation of leaflet shapes. Studies in South Australia have in fact shown that an ecoclinal situation exists in populations belonging to *A. prostratum* ssp. *prostratum*.

The general consistency of leaflet and segment shape within South Australian populations of *A. prostratum* ssp. *prostratum* has provided the characters for the recognition of two varieties, namely var. *prostratum* with ± linear or lanceolate leaflets and/or primary segments (Fig. 1 nos 16-19) and var. *filiforme* (A. Rich.) Kirk with ovate, obovate, elliptic or ± cuneate leaflets and/or primary segments (Fig. 1 nos 1-11) in the standard leaf. Intermediate leaflet types are illustrated in Fig. 1, nos 12-15.

In New Zealand the species *A. filiforme* (A. Rich.) Hook. is generally considered to be distinct from *A. prostratum*, despite the fact that it recognized almost completely because of its possession of trifoliate leaves and that Allan (1961) recorded large numbers of intermediates between it and *A. prostratum*. On the basis of the variation in the number and shape of leaflets known to occur in South Australian populations, largely the same as that observed in collections examined from New Zealand (CHR, WELTU) and described in Allan (l.c.), I believe the variation in ssp. *prostratum* to be similar in New Zealand to that which I have observed in South Australia.

(b) ssp *howense* Short ssp. *denticulatum* Short

Shape characters, and to a lesser extent, ultimate number of segments per standard leaf have been used to distinguish *A. prostratum* ssp. *denticulatum*, *A. prostratum* ssp. *howense* and one tentatively proposed but not formally recognized subspecies, ssp. A. from the Porongorup Ranges in Western Australia.

A. annuum Short

As in *A. prostratum* it is usual for the first produced leaves to differ from later leaves in shape and number of leaflets. However, in some collections (*Eichler 19337*) mature plants possess no more than 2-3 leaves, all being alike in size and shape. Within those individuals with more than one standard leaf the shape of the leaflets and lobes and the number of ultimate segments exhibit little variation. However, much variation in the shape and number of leaflets and ultimate segments occurs both within and between populations (Figs 3 and 4). The fact that environmental parameters greatly effect leaf characters is amply illustrated in Fig. 4, where seeds from coastal Yorke Peninsula plants (*Short 206*) were grown in the glasshouse in vermiculite and provided with an ample supply of a water/nutrient solution. Note that quaternary segments were produced under these conditions.

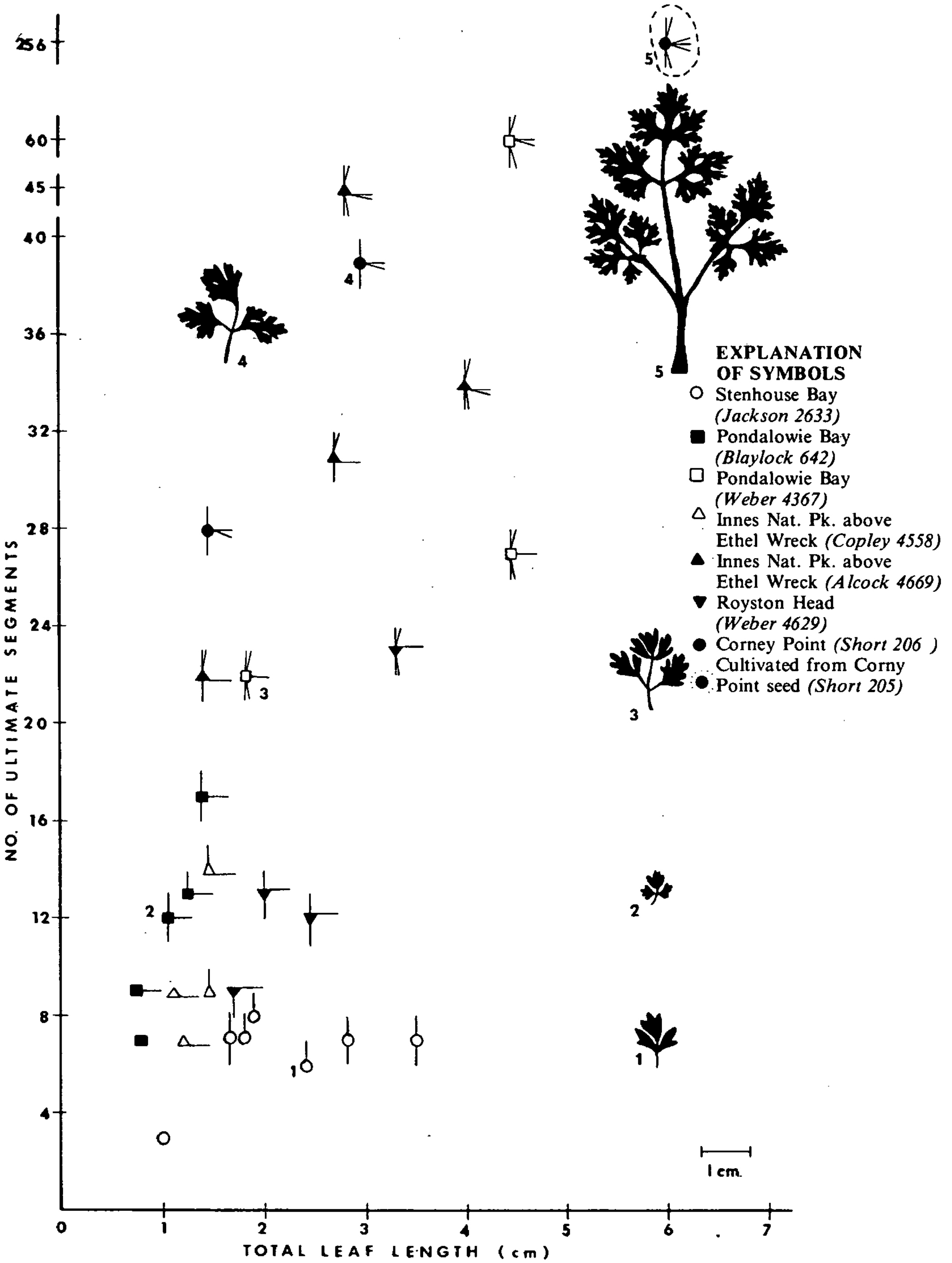


Fig. 4. Scatter diagram portraying the morphological intergradation between Southern Yorke Peninsula populations of *A. annuum* Short.

A. insulare Short

Insufficient material of this species was available to permit a study of the leaf variability. It was evident, however, that the standard leaf of this species generally possesses a larger number of ultimate segments and consistently differs by its broadly obovate leaflets in comparison with *A. prostratum* and *A. annuum*.

4. *Inflorescence*

All species of *Apium* have compound umbels. Individuals belonging to *A. annuum* and *A. prostratum* have either pedunculate or sessile compound umbels, with *A. prostratum* commonly possessing both types on one plant. *A. insulare* appears to possess only a very large pedunculate compound umbel.

The presence of involucral bracts and involucellal bracteoles in the inflorescence is diagnostically important in separating genera and sections in *Apium* sensu lato. Australasian species of *Apium* lack an involucellum, and usually an involucrum. However, a single bract has been rarely observed in some collections of *A. prostratum* and *A. insulare*.

5. *Pollen*

Studies by Cerceau-Larrival (1971) have revealed that the internal contour shape of a pollen grain is useful in distinguishing genera of Umbelliferae. Partly on the basis of the pollen morphology of *A. graveolens* and *A. leptophyllum*, Cerceau-Larrival recognized Wolff's section *Ciclospermum* (Lag.) Wolff as being sufficiently distinct to warrant generic status. Further pollen studies by Ferreira (1973) have supported this view.

In 1973 Ferreira described pollen of *A. australe* collected in South America and I have compared pollen from South Australian populations of *A. prostratum* with that of *A. australe*. The Erdtman (1952) method of acetolysis was used by Ferreira and this procedure was used for *A. prostratum*. No structural differences between the pollen of both species could be observed.

The scanning electron microscope was used to study pollen removed from herbarium material of *A. prostratum* and *A. annuum* but no gross morphological differences were found. This evidence supports the placement of *A. annuum* in *Apium* sect. *Apium* and not in *Ciclospermum*.

6. *Fruit*

The fruits of *A. annuum* and *A. prostratum* are markedly different. Mericarps of *A. annuum* are usually slightly concave on the commissural surface whereas this surface is flat in *A. prostratum*. The mericarps of *A. annuum* are also somewhat smaller than those of *A. prostratum* and have little thickening between the ribs. This last character is best seen in Figure 5 in which transverse sections of mericarps from *A. annuum, A. graveolens* and *A. prostratum* are shown. These figures also show that the size of the vascular bundles is somewhat larger in *A. prostratum* than *A. annuum*. The two species may also be distinguished on the basis of immature mericarps: in *A. annuum* the ribs are very small and rounded (Fig. 5D) whereas in *A. prostratum*, due to little thickening in the intervals, the fruit somewhat resembles the mature fruit of *A. annuum* (Fig. 5B).

The presence of very small ribs and large intervals in mericarps of *A graveolens* provide the best diagnostic character for distinguishing this species from *A. prostratum*. The fruit of *A. insulare* resembles those of *A. prostratum*.

7. *Chromosomes*

Cytotaxonomy in the Umbelliferae is still at the "alpha" level (Moore 1971), there being little information for this group other than recorded chromosome numbers. Moore (l.c.) has noted that chromosome number is of quite variable taxonomic use at the generic and specific levels with approximately one quarter of the genera showing some intra-specific variation.

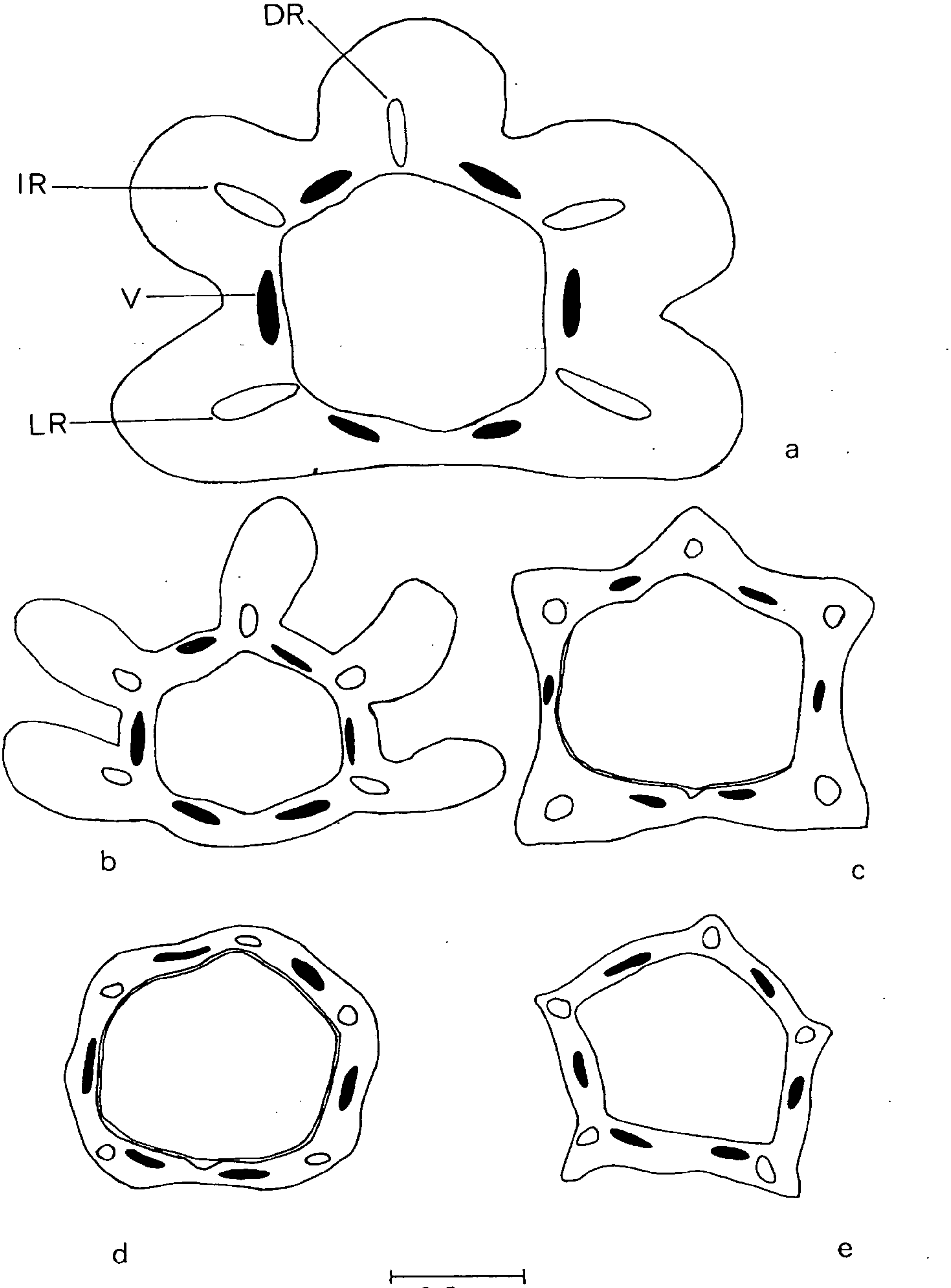


Fig. 5. Cross-sections of mericarps, A. *A. prostratum*, mature fruit (*Short 224*); B, *A. annuum*, mature fruit (*Short 206*); C. *A. annuum* ?, near mature fruit (*Eichler 17781*); D. *A. annuum*, immature fruit (*Alcock* AD 96932386); E. *A. graveolens*, mature fruit. Where DR = Dorsal rib bundle; IR = Intermediate rib bundle; LR = Lateral rib bundle; and V = Vitta.

Within *Apium,* counts have been made for a large number of species by Bell & Constance (1957, 1960, 1966), Beuzenberg & Hair (1963), Queiros (1972), Loeve & Kjellqvist (1974) and Constance, Chuang & Bell (1976). The results of this work are summarized in Table I. All species have n = 11, except for the two annuals, *A. leptophyllum* and *A. laciniatum* (DC.) Urban, which have n = 7. *A. leptophyllum,* partly because of this chromosome number, was placed in the genus *Ciclospermum* by Cerceau-Larrival (1964). The chromosome number of 2n = 22 recorded for *A. annuum* suggests that this species is rightfully placed in *Apium* rather than *Ciclospermum.*

Sharma & Bhattacharyya (1959) have constructed idiograms of *A. graveolens.* These are different from those constructed for *A. prostratum* by Beuzenberg & Hair* (1963); their idiograms of specimens belonging to *A. prostratum* var. *filiforme* show there to be little variation in the morphology of the chromosomes of individuals from different populations of this taxon.

Table 1. Chromosome numbers in *Apium* L.

Species	n =	2n=	Source
Sect. *Mauchartia*			
A. inundatum		22	Tutin 1975
A. nodiflorum	11	22	Queiros 1972 Loeve & Kjellqvist 1974 Constance & al. 1976
Sect *Apium*			
A. australe	11		Bell & Constance 1960; 1966 Constance & al. 1976
A chilense	11		Constance & al. 1976
A. aff. *chilense*	11		Bell & Constance 1957
A. commersonii	11		Constance & al. 1976
A. fernandezianum	11		Constance & al. 1976
A. graveolens	11		Constance & al. 1976
A. panul	11		Bell & Constance 1957; 1966 Constance & al. 1976
A. prostratum	11	22	Bell & Constance 1966 Beuzenberg & Hair 1963
A. sellowianum	11		Constance & al. 1976
A. annuum		22	Short unpublished
Sect. *Ciclospermum* (Lag.) DC. (= *Ciclospermum* Lag.)			
A. leptophyllum	7	14	Bell & Constance 1957; 1960 Queiros 1972 Constance & al. 1976
A. laciniatum			Bell & Constance 1957

* Beuzenberg & Hair published idiograms for *A. australe, A filiforme* and a hybrid specimen, *A. australe* x *A. filiforme.* However, having examined their voucher collections it is clear that all their specimens belong to *A. prostratum* var. *filiforme.*

8. *Reproductive Biology*

(a) *Breeding Systems*

Vegetative reproduction occasionally occurs in *A. prostratum* ssp. *prostratum*, some plants in populations from Cape Lannes (*Short 131*) producing stolons. Plants that reproduce by this method still produce viable seeds.

(b) *Seed Dispersal*

Ewart (1908) recorded that some seeds of *A graveolens* were viable after a period of 13 months floating on sea water. If such resistance to seed damage by sea water occurs in *A. prostratum* and *A. insulare* then this would perhaps be a mechanism which explains the wide distribution of these species along the Australian coast-line. However, both *A. prostratum* and *A. annuum* also occur inland and water dispersal cannot be the only method of seed dispersal.

(c) *Hybridization*

The only substantiated record of hybridization in *Apium* occurs in sect. *Mauchartia* [DC.] Benth, Tutin (1975) recorded a hybrid between *A. inundatum* (L.) Reichenb. and *A. nodiflorum* (L.) Lag. The hybrid was found to flower much less freely than the parents and appeared to be completely sterile.

By using the double stain method outlined by Owczarzak (1952) pollen sterility tests were carried out on many individuals from populations of both *A. annuum* and *A. prostratum*. It was found that individuals examined from both species consistently had high percentages (much greater than 90%) of apparently functional pollen.

No evidence has been found to suggest that hybridization occurs between any of the Australasian species of *Apium*.

(d) *Phenology*

From observations in the field and information obtained from herbarium collections, it is evident that *A. annuum* flowers in late spring and early summer while *A. prostratum* flowers throughout the summer and even early autumn.

Taxonomy

APIUM L.

Apium L., Sp.Pl.(1753)264; Gen.Pl.(1754)83, n.238; DC.Prodr.4(1830)100, p.p.; Benth. in Benth. & Hook. f., Gen.Pl.1(1867)888, p.p.; Drude in Engler & Prantl, Pflzfam.3(1898)184, p.p.; Wolff in Engler, Pflanzenr.90(1927)32, p.p.
Lectotype (Hitchcock, Prop.Brit.Bot.(1929)142, n.v., fide ING): *A. graveolens* L., l.c. (Lectotype not *A. petroselinum* L. (= *Petroselinum crispum*) as designated by Britton & Brown, Illus.Fl.2(1913)642, vide ICBN (1972) Art.8).

Mauchartia Neck., Elem.1(1790)172, *nom.inval.* vide ICBN (1972) Art. 20(2).

Helosciadium Koch, Nova Acta Phys.-Med.Acad.Leop.-Carol.12(1824)125; DC., Prodr.4(1830)104, p.p.
Lectotype (Britton, Fl.Bermuda (1918)278, n.v., fide ING): *H. nodiflorum* (L.) Koch, l.c.

Terrestrial, aquatic or amphibious, annual, biennial or perennial *herbs;* glabrous, prostrate or erect and ascending. *Leaves* petiolate, with sheathing base, blade simply pinnate to ternately-pinnately compound; leaflets or segments widely elliptic to linear. *Inflorescence* leaf opposed, a sessile or pedunculate compound umbel; *bracts* absent or conspicuous;

bracteoles absent or conspicuous; *rays* ascending; *pedicels* ascending. *Flowers* bisexual: sepals 5 minute lobes or absent; *petals* 5, white or light greenish, ± ovate, inflexed at apex: *stamens* 5; *ovary* glabrous, stylopodium low-conic to depressed; *styles* 2, with terminal stigma, spreading or divaricate. *Fruit* a schizocarp, ovoid, ovoid oblong, globose or ovoid blobose, glabrous; *central axis* (carpophore) thick and shortly bifid; fruiting carpels (mericarps) 2, with prominent ± equal ribs, ± terete in transection; vittae solitary in the intervals, 2 on the commissure. *Chromosome number:* n = 11.

Distribution

About 20 species native to Europe, Asia, Africa, South America and Australasia. Four species occur in Australia, 3 indigenous and one naturalized.

Ecology

Species may be terrestrial, aquatic or amphibious.

Key to sections and species of *Apium* L. in Australasia

1a. Bracts generally absent, rarely one present; bracteoles always absent. Plants terrestrial. (Australasia, South America, Europe .... Sect. *Apium*

2a. Mature mericarps almost covered by prominent corky ribs which although divergent are adjacent to each other at the base, with seed wall barely apparent between ribs. Mericarps in radial longitudinal section with flat commissural surface. Plants biennial or perennial 3

3a. Plants prostrate with thin stems less than 0.5 cm in diameter; inflorescence of pedunculate and sessile compound umbels or sessile compound umbels only .... 1. *A. prostratum*

3b. Plants erect, with thick stem 0.5-1.0 cm diameter, inflorescence a pedunculate compound umbel .... 2. *A. insulare*

2b. Mature mericarps with thin ribs which are separate from each other, with seed wall apparent between ribs, the interval being approximately as broad or several times as broad as the ribs. Mericarps in radial longitudinal section with flat or concave commissural surface. Plants annual or biennial 4

4a. Plants annuals, stems short, to 10(15) cm long. Mericarps with width of the intervals at the seed face approximately equal to width of the ribs, in radial longitudinal section with concave commissural surface .... 3. *A. annuum*

4b. Plants biennials, erect to almost prostrate, stems longer than 30 cm. Mericarps with width of the intervals at the seed face several times width of the ribs, in radial longitudinal section with flat commissural surface. (Introduced species: not described) .... *A. graveolens*

1b. Bracts and bracteoles several. Plants aquatic or amphibious. (Euiasia and Africa; *A. nodiflorum* (L.) Lag. naturalized in New Zealand)* .... Sect. *Mauchartia* [DC] Benth.

1. **Apium prostratum** Labill. ex Vent., Jard. Malm. (1804/5) t.81; Labill., Relat. Voy. Perouse (1800)141, nomen nudum; Labill., Nov. Holl. Pl. Spec. 1(1805)76, t.103; Kirk, St. Fl. N.Zeal. (1899)196, p.p. (excl. South America, South Africa, Tristan da Cunha); T.F. Cheesem., Man. N.Zeal. Fl. (1906)205, p.p. (excl. Antarctic America, South Africa and Tristan da Cunha); Maiden, Proc. Linn. Soc. N.S.W. 23(1898)129, ? p.p. (excl. *A. insulare* Short); Laing & Blackwell, Pl. N.Zeal. (1907)454; Domin, Bibl. Bot. 89(1929)1048, p.p. (excl. Antarctic America); Beadle et al., Fl. Sydney Region (1972)396, -*Petroselinum prostratum* (Labill. ex Vent.) DC., Prodr. 4(1830)102; A. Rich., Fl. Nouv.Zel. (1832)278; Hook., Ic. Pl. 4(1840) t.205. - *Helosciadium prostratum* (Labill. ex Vent.) Bunge in Lehm., Pl. Preiss 1(1844/45)295.

Type: "Plant herbacee, annuelle, originaire de la Nouvelle Hollande, cultivee de graines rapportees par le capitaine Hamelin". *Holotype* P (photograph only seen); *Isotype* G (Herb. de Candolle ex microfiche IDC).

Petroselinum filiforme A. Rich., Voy.Astrolabe Bot., Fl.Nouv.Zel.(1832) 278. - *Apium filiforme* (A. Rich.) Hook., Ic.Pl.9(1852) t.819; Hook.f., F.N.Zel.(1852)87; Hook.f., Handb.N.Zeal.Fl.1(1867)90; Wolff in Engler, Pflanzenr.90(1927)33, (excl. South Africa) p.p., Allan, Fl.N.Zeal.1(1961)462.

*C.J. Webb. pers. comm. 1977.

Type: "Crescit in humidis Novae-Zeelandiae, locis dictis detroit de Cook, havre de l'Astrolabe" P (photograph only seen).
Apium australe auct. non Pet.-Thou.: Hook, f., Fl. N.Zel. 1(1852)86; Hook. f., Fl. Tasm. 1(1856)160, p.p. (excl. at least Tristan da Cunha); Hook. f., Handb. N.Zeal. Fl. (1864)90; Benth., Fl. Austral. 3(1867)372, p.p. (excl. *A. annuum* Short eg. Anon. MEL 503676, *A. insulare* Short, e.g. and Antarctic America, South Africa); F.M. Bailey, Queensl. Fl. (1900)724, p.p.; Rodway. Tasm. F. (1903)55, ? p.p. (as to *A. insulare* Short); Black, Fl. S.Austral. 1 ed. (1926)444, 2 ed. (1952)662, p.p. (excl. *A. annuum* Short e.g. Anon AD97619035 and Temperate South America); Wolff in Engler, Pflanzenr. 90(1927)33, p.p. (excl. South America); Ewart, Fl. Vict. (1931)907, p.p.; Blackall & Grieve, W. Aust. Wildfls. (1965)494.
Helosciadium australe auct. non (Pet.-Thou.) Bunge: Bunge in Lehm., Pl. Preiss. 1(1844/45)294.
N.B. For additional references see under synonymy of infraspecific taxa.

Terrestrial, biennial or perennial *herb,* glabrous, prostrate with branches (30)40-60(70) cm long, thin, less than 0.5 cm diameter. *Leaves* variable (for more detailed description see infraspecific taxa), those opposite compound umbels (2)4-9(14.6) cm long; leaflets primary or (in ssp. A) secondary, (3)5-7(11) in all, ± linear, ± lanceolate, elliptic ovate, obovate to oblanceolate in outline, entire or all with ± linear, ± lanceolate, ovate, obovate, elliptic or + cuneate primary segments, often secondary, tertiary and rarely quaternary segments present; ultimate segments (0) 6-50 (141), acute or obtuse; basal leaves (5.2)(6-15(40.5) cm long; leaflets similarly variable in outline to those of leaves opposite umbels. *Compound umbels* sessile or pedunculate; peduncle when present (0.2)0.5-1.5(2) cm long, ca. 1 mm diameter; bracts generally absent, occasionally one present; bracteoles always absent; rays (2)4-7(15) per inflorescence, (0.4)1-3.5(5.6) mm long. *Petals* white with yellow-brown mid-vein, ovate, (0.75)0.9-1.3(1.5) mm long, (0.5)0.5-0.7(1.0) mm wide, constricted at base, apex acute. *Stamens* less than or approximately the length of the petals, (0.55)0.6-0.8(1.0) mm long, filaments with ± yellow; anthers white ± yellow or purple, 0.3-0.4 mm long, 0.3-0.4 mm wide. *Ovary* glabrous, stylopodium disc like; style about equalling height of stylopodium, (0.25)0.3-0.35(0.4) mm long. *Schizocarp* obovate to orbicular, (1.3)1.5-2(2.5) mm long, (1.2)1.5-2.1(2.6) mm broad; carpophore very shortly bifid; mericarps in radial longitudinal section flat on commissural surface, hexagonal in transection, almost covered by prominent corky ribs with seed wall barely apparent between ribs; vittae large, solitary in the intervals, 2 on the commissure. *Chromosome number:* n = 11. Figs 1-2, 5, 9-12

Notes

1. Wolff (1927) considered the two species *A. prostratum* and *A. australe* Pet.-Thou. to be conspecific. On the other hand Bell & Constance (1960, 1966) and Constance, Chuang and Bell (1976) have referred to specimens from South America as *A. australe,* and Australian specimens as *A. prostratum.* Having seen a photograph of the type specimen (Fig. 8) and several other collections of *A. australe* from Tristan da Cunha *(Christophersen 445, 2419, 2421* and *Dyer 3568* — housed at K) it is evident to me that *A. australe* is a distinct species. Although I have seen few collections it appears that it can be easily distinguished from *A. prostratum* by the (a) erect, robust stem, (b) the large obovate leaflets on the majority of cauline leaves and (c) the more or less lanceolate leaflets and segments of the leaves surrounding the umbels.

2. In its natural coastal habitat celery, *A. graveolens,* displays vegetative characteristics not unlike those found in *A. prostratum.* In parts of South Australia *A. graveolens* has become established along the coast and unless mature fruits are available it is difficult to recognize this species as being distinct from *A. prostratum.*

The following key to the infraspecific taxa of *A. prostratum* is based on the characters of leaves opposite mature umbels.



Fig. 6. *A. australe* Pet.-Thou. Holotype (P).

Key to infraspecific taxa of *A. prostratum* (see Figs 1, 2, 9-12)

1a. Leaves with (0)10-40(74) ultimate segments to tertiary order. Leaflets of only primary or sometimes secondary orders present 2

2a. Primary segments of leaflets either trifid or tripartite with (0)3-9(10) secondary segments per leaflet. Leaflets 3, 5 or 7 3

3a. Leaflets entire or divided. Ultimate segments sometimes only primary order, sometimes up to tertiary order, number of ultimate segments (0)6-30(74) per leaf. Primary segments, when divided into secondary segments, (2)3.7-6.5(7) mm broad at point immediately below divisions forming secondary segments .... a. ssp. *prostratum* 4

4a. Leaflets entire or divided. Undivided leaflets and primary segments of divided leaflets ± linear or lanceolate with length (6)7-12(15) times the greatest breadth in outline .... a.1. var. *prostratum*

4b. Leaflets divided. Primary segments elliptic, ovate, obovate or ± cuneate with length (ca. 0.5) 2-3 times the greatest breadth in outline .... a.2. var. *filiforme*

3b. Leaflets always divided. Ultimate segments always up to tertiary order, number of ultimate segments 37-66 per leaf. Primary segments (1.0)1.1-2.5(3.6) mm broad at point immediately below divisions forming secondary segments .... b. ssp. *howensis*

2b. Primary segments or leaflets denticulate, with (6)10-20(36) secondary segments per leaflet. Leaflets 3-5 .... c. ssp. *denticulatum*

1b. Leaves with more than 100 ultimate segments to quaternary order. Leaflets of both primary and secondary orders present .... see *A. prostratum* ssp. "A"

a. ssp. **prostratum**

Leaves opposite compound umbels (3.3)4-9(13.4) cm long; primary leaflets only, (3)5-7 in all, entire or divided, ± linear ± lanceolate, elliptic, ovate, obovate or ± cuneate in outline, primary segments in divided leaflets commonly trifid to tripartite, sometimes entire, (2)3.7-6.5(7) mm broad measured immediately below divisions forming secondary segments; ultimate segments to tertiary order, (0)6-30(74) per leaf; *basal leaves* (5.2)5-15(40.5) cm long, leaflets (3)5-7(9), variously divided as in leaves opposite umbels.

Distribution (Figs 7,8)

The ssp. *prostratum* is found in coastal situations and inland throughout Southern Australia (extending little further north than Brisbane), Tasmania and New Zealand. Two ecotypically distinguished varieties, occur throughout the range of the subspecies.

Ecology

A. prostratum ssp. *prostratum* occurs in a wide spectrum of habitats, ranging from coastal sand dunes to brackish swamps and inland freshwater streams. The two varieties of *A. prostratum* ssp. *prostratum*, namely var. *prostratum* and var. *filiforme*, appear to be well defined ecotypically within this range (for details refer to ecological treatment under each variety).

This species flowers in the summer and early autumn.

Notes

1. The existence of two extreme leaf types has, along with ecological considerations provided the basis for the recognition of two varieties, var *prostratum* and var. *filiforme*. Few intermediate specimens, var. *prostratum-filiforme* (Figs 1, 2, 9) have been seen from Western Australia and New Zealand, but approximately 25% of specimens of ssp. *prostratum* examined from South Australia, Tasmania, Victoria, New South Wales and Queensland are perhaps best regarded as intermediates. This figure is approximate as, unfortunately many collections examined were inadequate, only a small portion of a plant being represented. For identification it is desirable to have entire, mature plants.

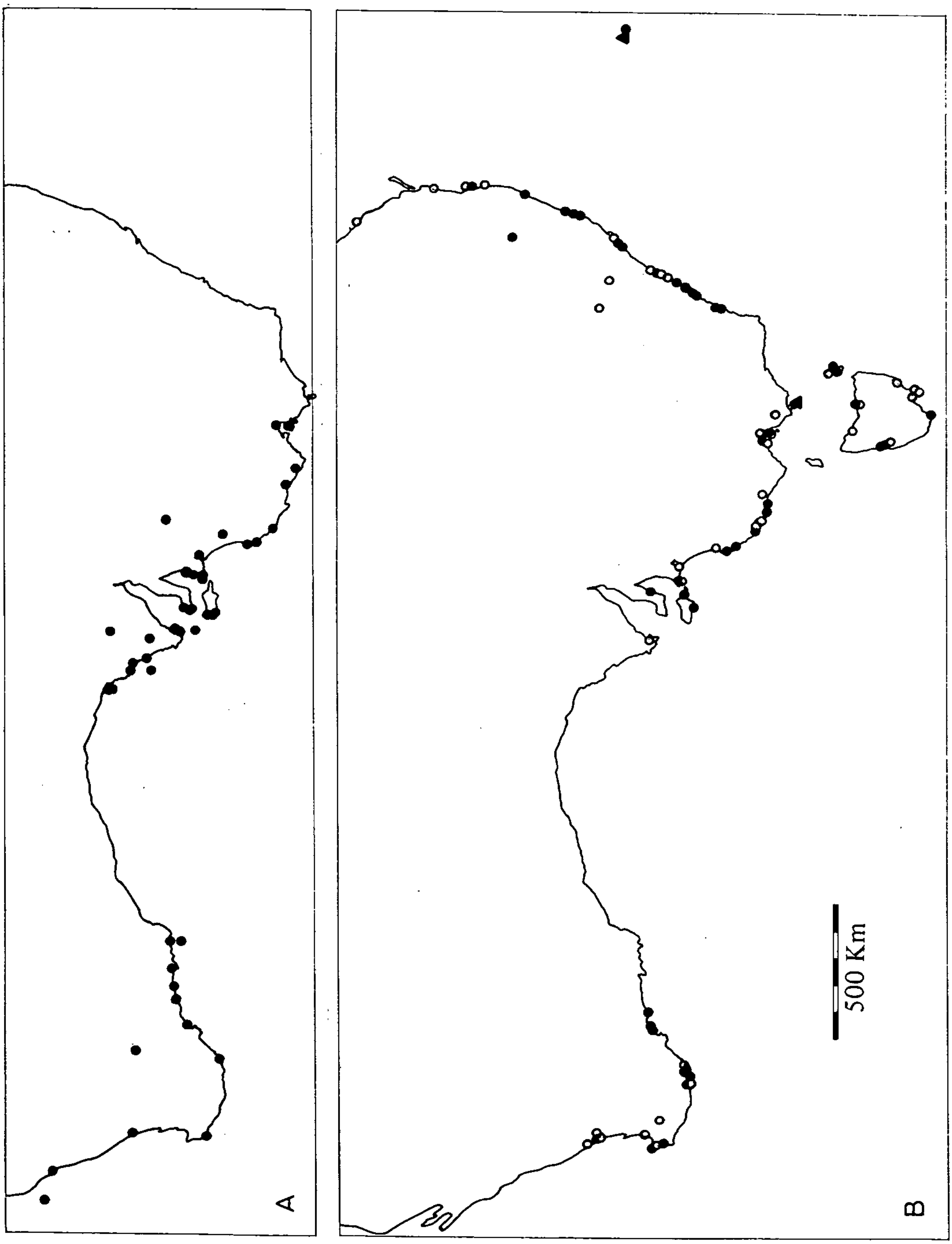


Fig. 7. Distribution of *Apium* in Australia and Lord Howe Island. A. *A. annuum* Short. B. *A insulare* Short (triangles); *A. prostratum* Labill. ex Vent. ssp. *prostratum* var. *prostratum* (circles); *A. prostratum* Labill. ex Vent. ssp. *prostratum* var. *filiforme* (A. Rich.) Kirk (dots).

a.1. var. **prostratum**

Apium prostratum Labill. ex Vent.,Jard.Malm. (1804/5) t.81; F. Muell., First Syst. Cens. Austral. Pl. (1882)63, p.p. (excl. *A. insulare* Short, *A. annuum* Short, *A. prostratum* var. *filiforme* (A. Rich.) Kirk); F. Muell., Key Syst. Vict. Pl. 2(1885)26, p.p. (as in preceding); F. Muell., Key Syst. Vict. Pl. 1(1887)269, p.p. (as in preceding); F. Muell., Sel. Extratr. Pl. (1888)40, p.p. (as in preceding); F. Muell., Sec. Syst. Cens. Austral. Pl. (1889)108, p.p. (as in preceding); C. Moore, Handb. Fl. N.S.W. (1893)221, p.p.: Hemsl., Ann. Bot. 10(1896)238, ? p.p.; Maiden, Proc. Linn. Soc. N.S.W. 23(1898)129 ? p.p.; Kirk, Stud. Fl. N.Zeal. (1899)196, p.p. (excl. *A. prostratum* var. *filiforme* (A. Rich.) Kirk and taxa from South America, South Africa, Tristan da Cunha; Maiden & Betche, Cens. N.S.W. Pl. (1916)162, p.p.; Domin. Bibl. Bot. 89(1929)104? p.p. (excl. Antarctic America); W.M. Curtis, Stud. Fl. Tasm. (1963)255, p.p. (excl. *A. insulare* Short and *A. prostratum* var. *filiforme* (A. Rich.) Kirk); Eichler, Suppl. to Black's Fl. S.Austral. (1965)252, p.p. (excl. *A. annuum* Short and *A. prostratum* var. *filiforme* (A. Rich.) Kirk); Beadle et al., Fl. Sydney Region (1972)396, p.p. (excl. *A. prostratum* var. *filiforme* (A. Rich.) Kirk); Willis, Handb. Pl. Vict. 2(1973)490, p.p. (excl. *A. insulare* Short, *A. annuum* Short and *A. prostratum* var. *filiforme* (A. Rich.) Kirk). — *Petroselinum prostratum* (Labill. ex Vent.) DC., Prod. 4(1830)102 p.p.; A. Rich., Fl. Nouv.Zel. (1832)278 p.p.; (as to Labill. citation); Hook., Ic. Pl. 4(1840) t.305 p.p. (excl. some collns of *Gunn 386*).

Apium australe var. *angustisectum* Wolff in Engler & Prantl, Pflanzenr. 90(1927)33; Allan, Fl. N.Zeal. 1(1961)463.

Type: None designated; lectotype will have to be chosen from material studied by Wolff. Wolff's specimens of this taxon housed at Berlin have been destroyed (Dr H. Ern, pers.comm., 1977).

Apium graveolens auct. non L. Hook. f., Fl. Antarct. 2(1846)287, p.p. (excl. Southern America, Falkland Is., Tristan da Cunha, Cape of Good Hope).

Apium australe auct.-non Pet.-Thou.; Benth., Fl. Austral. 3(1867)372, p.p. (excl. *A. annuum* Short, *A. insulare* Short, *A. prostratum* var. *filiforme* (A. Rich.) Kirk, *A. prostratum* ssp. *howense* Short; F.M. Bail., Syn. Queensl. Fl. (1883)212, p.p.; F.M. Bail., Queensl. Fl. (1900)724, p.p.; Rodway, Tasm. Fl. (1903)66, p.p. (excl. *A. prostratum* var. *filiforme* (A. Rich.) Kirk and *A. insulare* Short); F.M. Bail., Compreh. Catal. Queensl. Pl. (1913)229, p.p.; Black, Fl. S.Austral. 1 ed. (1926)444, 1 ed. (1952)662, p.p. (excl. *A. annuum* Short, *A. prostratum* var. *filiforme* (A. Rich.) Kirk, as to AD97619035); Ewart, Fl. Vict. (1931)1906, p.p.).

Apium australe var. *β* Hook. f., Fl. N.Zel. 1(1852)86, ? p.p.; Hook. f., Fl. Tasm. 1(1856)160; Hook. f., Handb. N.Zeal. Fl. 1(1867)90.

Apium prostratum var. *β* T.F. Cheesem., Man. N.Zeal. Fl. 1 ed. (1906)205, 2 ed. (1925)657.

Leaves opposite umbels with leaflets entire or divided with primary segments or divided leaflets or entire leaflets ± linear or ± lanceolate, with a length (6)7-12(15) times the greatest breadth; ultimate segments usually primary, rarely to secondary order, (0)4-12(20) per leaf. Figs 1-2.

Distribution (Figs 7, 8)

A. prostratum var. *prostratum* occurs along the southern coastline of Australia, extending as far North as Brisbane. It is also found to occur inland, unlike var. *filiforme* which tends to be more restricted to coastal situations. The variety also occurs in New Zealand.

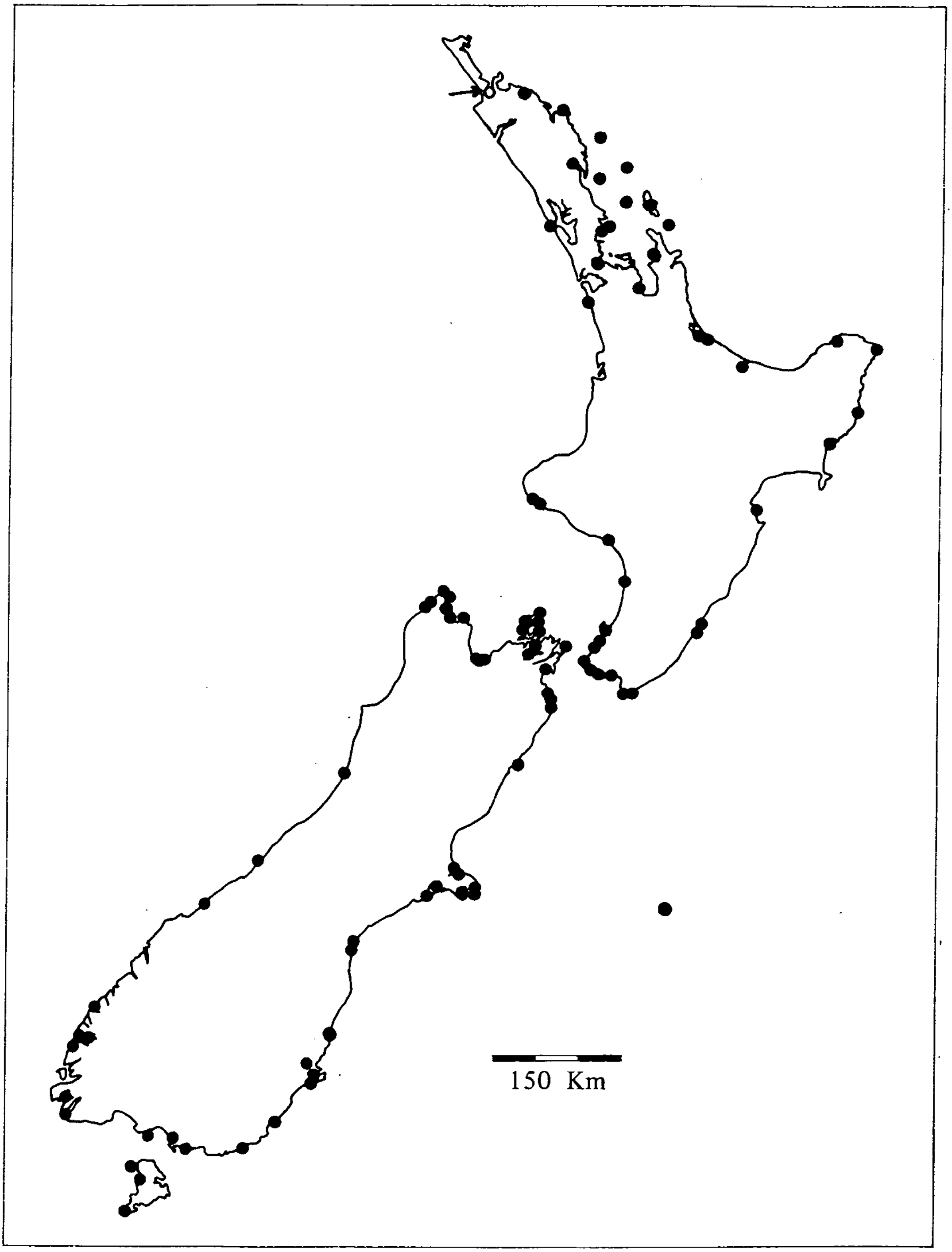


Fig. 8. Distribution of *A. prostratum* Labill. ex Vent. ssp. *prostratum* var. *prostratum* (circle), *A. prostratum* ssp. *prostratum* var. *filiforme* (A. Rich.) Kirk (dots) in New Zealand.

Ecology

The variety, when found on the coastline grows at the mouth of fresh-water rivers or drains or in brackish water in semi-saline swamps. Similarly when found in inland situations var. *prostratum* occurs in areas where fresh to brackish water is readily available.

Specimens examined: selection only, including important specimens cited by past workers, e.g. W.J. and J.D. Hooker.

WESTERN AUSTRALIA: *Aplin 1364*, two miles north of Bridgetown, 11.xii.1961 (PERTH); *Burbidge 8117*, Two Peoples Bay, E. of Albany, 24.i.1973 (PERTH); *Drummond 124*, s.dat. (K); *Drummond 141*, Swan River, s.dat. (K); *Olfield s.n.*, Murchison River, s.dat. (K).

SOUTH AUSTRALIA; *Alcock 3257*, Southern Eyre Pen., Hundred of Lincoln, i.iv.1970 (AD); *Cleland s.n.*, Encounter Bay, Inman River mouth, 16.i.1944 (AD 96011076); *Dodson 150*, Piccaninnie Ponds, 9.iii.1972 (AD); *Short 189-201*, Kingston, 7.iii.1976 (AD); *Wade s.n.*, Goolwa, 24.iii.1940 (AD 966050516).

VICTORIA: *Adamson 195*, Melbourne, 8.xi.1853 (K); *Morrison s.n.*, Plenty River, 16.i.1892 (CANB 129300); *Morrison s.n.*, Upper Werribee River, 9.xii.1893 (CANB 129301, K); *Morrison s.n.*, North Williamstown, 16.ii.1895 (AD 9641220, CANB 129303, K); *Short 178-185*, Glenelg River, Nelson, 5.iii.1976 (AD).

TASMANIA: *Backhouse s.n.*, Port Arthur, s.dat. (K); *Gunn 68*, Anderson's Creek, Yorketown, 11.i.1843 (NSW 139056); *Gunn 68*, Launceston, 24.xii.1844 (K); *Maiden s.n.*, Risdon Cove, -.ii.1906 (NSW 139077); *Maiden & Cambage s.n.*, Swanport to Swansea, -.i.1902 (NSW 139053).

NEW SOUTH WALES: *Coveny 107*, Manly Lagoon, 18.ii.1968 (NSW); *Cross & Vickery s.n.*, Narrabeen, 2.iii.1944 (NSW 139092); *Maiden s.n.*, Sussex Inlet, -.ii.1917 (NSW 139113); *Rodway s.n.*, Cronulla, 6.viii.1933 (NSW 90331); *Salasoo 3332*, S.W. shore of Wallis Lake, S.W. of Forster, 7.i.1967 (NSW)

QUEENSLAND: *Durrington & Batianoff 1451*, Heath Island 3.2 km W. of Cape Moreton, 18.xii.1974 (BRI, K); *MacGillivray B136*, Port Curtis, -.xi.1847 (K); *White 7192*, Noosa River, 17.i.1931 (BRI); *White 8821*, Currumbin, 12.xi.1932 (BRI).

NEW ZEALAND: *Carse s.n.*, Wharekia, Ranganui, -.i.1915 (CHR 3383); *Mathews & Carse s.n.*, Awanui River, s.dat. (CHR 18963); *Matthews & Carse s.n.*, Ohiro, Awanui Harbour, -.i.1914 (CHR 20553).

a.2. var. **filiforme** (A. Rich.) Kirk, Stud. Fl. N.Zeal. (1899)196; Cheesem., Man. New Zeal. Fl. 1 ed. (1906)205; Domin. Bibl. Bot. 89(1929)1048, ? p.p. — *Petroselinum filiforme* A. Rich., Fl. Nouv.Zel. Voy. Astrolabe Bot. (1832)278. — *Apium filiforme* (A. Rich.) Hook., Ic. Pl. 9(1851) t.819, (incl. var.α & var.β *trifidum;* q.v.); Hook. f., Fl. N.Zel. (1853)87; Hook. f., Handb. N.Zeal. Fl. 1(1867)90; Cheesem., Man. New Zeal. Fl. 2 ed. (1925)657; Wolff in Engler & Prantl, Pflanzenr. 90(1927)33; Allan, Fl. N.Zeal. 1(1961)462.

Type: "Crescit in humidis Novae-Zeelandiae, locis dictis detroit de look, havre de l'Astrolabe" P (photograph only seen).

Apium prostratum Labill. ex Vent.; Labill., Nov. Holl. Pl. Spec. 1(1805)76, t.103; F. Muell., First Syst. Cens. Austral. Pl. (1882)63, p.p. (excl. *A. insulare* Short, *A. annuum* Short, *A. prostratum* var. *prostratum* as to MEL collns); F. Muell., Key Syst. Vict. Pl. 2(1885)26, p.p. (as in preceding); F. Muell., Key Syst. Vict. Pl. 1(1887/8)269, p.p. (as in preceding); F. Muell., Sel. Extratr. Pl. (1888)40, p.p. (as in preceding); F. Muell., Sec. Syst. Census Austral. Pl. (1889)108, p.p. (as in preceding); C. Moore, Handb. Fl. N.S.W. (1893)221, p.p.; Hemsl., Ann. Bot. 10(1896)238, ? p.p.; Maiden, Proc. Linn. Soc. N.S.W. 23(1898)129, ? p.p.; Kirk, Stud. Fl. N.Zeal. (1899)196, p.p.; Maiden & Betche, Census N.S.W. Pl. (1916)162, p.p.; W.M. Curtis, Stud. Fl. Tasm. (1963)255, p.p. (excl. *A. insulare* Short and *A. prostratum* var. prostratum); Eichler, Suppl. to Black's Fl. S.Austral. (1965)252, p.p. (excl. *A. annuum* Short and *A. prostratum* var. *prostratum*); Beadle et al., Fl. Sydney Region (1972)396, p.p. (excl. *A. prostratum* var. *prostratum*); Willis, Handb. Pl. Vict. 2(1973)490, p.p. (excl. *A. insulare* Short, *A. annuum* Short and *A. prostratum* var. *prostratum* as to specs in MEL). — *Petroselinum prostratum* (Labill. ex Vent.(DC., Prod. 4(1830)102, p.p.; A. Rich., Fl. Nouv.Zel. (1832)278, p.p. (as to Labill. citation).

Apium filiforme var. β *trifidum* Hook., Ic.Pl.9(1851) t.819

Type: "Near Nelson, New Zealand, Mr Bidwill (n. 94A)" K.

? *Apium prostratum* var. *maritimum* Domin, Bibl.Bot.89(1929)1048

Type: Not known, see note 2.

Apium australe var. *latisectum* Wolff. nom.illeg. in Engler & Prantl, Pflanzenr.90(1927)32, p.p. (excl. *A. prostratum* var. *prostratum* as to *Drummond 124*, ? *A. insulare* Short as to *Gunn 386* (p.p.), ? *A. annuum* Short as to Mueller collections from South Australia and Victoria); Allan, Fl.N.Zeal.1(1961)463. Wolff's name is illegitimate as both the distribution and circumscription of the taxon given by Wolff includes the type of *A. australe* Petit-Thouars collected from Tristan da Cunha.

Apium australe auct.non (Pet.-Thou.: Benth., Fl. Austral. 3(1867)372, p.p. (excl. *A. annuum* Short, *A. insulare* Short, *A. prostratum* var. *prostratum*, *A. prostratum* ssp. *howense* Short): F.M. Bail., Syn. Queensl. Fl. (1883)212, p.p.: F.M. Bail., Queensl. Fl. (1900)724, p.p.; Rodway, Tasm. Fl. (1903)66, p.p. (excl. *A. insulare* Short and *A. prostratum* ssp. *prostratum* var. *prostratum*); F.M. Bail., Weeds and Pois. Pl. Queensl. (1906)64, p.p.; F.M. Bail., Compreh. Catal. Queensl. Pl. (1913)229, p.p.; Black, Fl. S.Austral. 1 ed. (1926)444, 2 ed. (1952)662, p.p. (excl. *A. annuum* Short, *A. prostratum* ssp. *prostratum* var. *prostratum* as to Anon, AD 97619035); Ewart, Fl. Vict. (1931)906, p.p.; W.R. Sykes, Kermadec Islands Fl. (1977)146.

Apium australe var. α Hook.f., F.N.Zel.1(1852)86; Hook.f., Fl.Tasm.1(1856)160; Hook.f., Handb.N.Zeal.Fl.1(1867).

Apium prostratum var. α T.F. Cheesem., Man.N.Zeal.Fl.(1906)205, p.p. (excl. Antarctic America, South Africa and Tristan da Cunha); Cheesem., Man.N.Zeal.Fl. 2 ed.(1925)657, p.p. (as in preceding).

Leaves opposite compound umbels with leaflets divided, elliptic, ovate, obovate, or ± cuneate, primary segments elliptic, ovate, obovate, or ± cuneate in outline, with length (ca. 0.5)2-3 times the greatest breadth, ultimate segments to tertiary order (8)12-40(74) per leaf. Figs 1-2.

Distribution (Figs 7, 8)

A prostratum var. *filiforme*, like the preceding variety, is distributed along the southern coastline and along the eastern coastline of Australia as far north as Brisbane. It also occurs in New Zealand.

Ecology

A. prostratum var. *filiforme* is almost invariably restricted to the coastline growing away from river mouths in often quite exposed areas of the foreshore.

Notes

1. The name var. *filiforme* was originally applied by Richard (1899) when describing the thin stems of the plant. It does not refer to leaf shape which is anything but filiform.

2. It is unclear whether Domin considered specimens from Brisbane River (*Dietrich 364*, *White s.n.*) to belong to *A. prostratum* var. *maritimum* as he cited these collections immediately below his notes on the geographical distribution of the species and above the description of the variety. Neither of the specimens have been labelled *A. prostratum* var. *maritimum* and neither appears to fit within the circumscription of the variety. Domin (1929, p. 1048) described this variety as having "foliis pinnatis, segmentis brevioribus latis, plerumque obovatis vel obcuneatis, caulibus robustis". The branches of *Dietrich 364* (Fig. 9) are robust but in both this and the *White s.n.* collection the leaf segments are not shorter than their width. This applies irrespective of the definition of a segment. All leaflets and segments, as defined in the present paper, are usually longer than, or approximately equal to, their width. Both specimens are best regarded as intermediates between var. *prostratum* and var. *filiforme* (A. Rich.) Kirk of *A. prostratum* ssp. *prostratum*.



Fig. 9. *A. prostratum* Labill. ex Vent. ssp. *prostratum* var. *prostratum-filiforme* (*Dietrich 364*, PR).



Fig. 10. *A. prostratum* Labill. ex Vent. ssp. *howense* Short Holotype (*Chinnock s.n.* AD 97803258).

Specimens examined: selection only, including important specimens cited by past workers, e.g. J.D. Hooker, H. Wolff.

WESTERN AUSTRALIA; *Colli(s) s.n.*, Cape Naturaliste, s.dat. (K); *Demarz 4253*, road to natural bridge, Albany, 9.i.1973 (PERTH); *Drummond 293*, Swan River, s.dat. (K); *Newbey 3135*, 2 miles S. of Middle Mt. Barren, 21.iii.1970 (PERTH); *Royce 5424*, West Cape Howe, 7.iii.1956 (PERTH).

SOUTH AUSTRALIA; *Lothian 822*, Flour Cask Bay, Kangaroo Island, 12.i.1962 (AD); *Short 50-104*, Pt Elliot, 17.ii.1976 (AD); *Short 108-126*, Robe sand dunes, 5.iii.1976 (AD); *Short 130-134*, Cape Lannes, 5.iii.1976 (AD); *Wilson 1159* near Beachport, 12.xi.1959 (AD).

VICTORIA: *Johnson s.n.*, Mt Martha, -.ii.1949 (NSW 139067); *Morrison s.n.*, Cheltenham, 14.i.1893 (K); *Morrison s.n.*, Brighton, 24.iv.1895 (BRI 214147); *Weston 1640*, Nelson, south of mud lake near beach, 30.ix.1965 (AD); *Williamson s.n.*, Port Fairy, -.xi.1902 (NSW 139063).

TASMANIA: *Garden s.n.*, Ocean Beach, Strahan, 20.i.1949 (NSW 139054); *Gunn 386*, Circular Head, 7.i.1837 (K); *Gunn 386*, 5 Mile Bluff, 27.i.1843 (NSW 139055); *Belcher & Belcher 1481*, South Cape Bay, 15.ii.1968 (AD); *Whinray 716*, Big Chalky Island, Furneaux Group, s.dat. (AD).

NEW SOUTH WALES: *Atkin s.n.*, Kiama, 12.i.1905 (NSW 13963); *Blaxell 205*, Big Gibber, east of Bombah Pt, Myall Lakes, 13.ii.1969 (NSW); *Constable s.n.*, Red Head Beach, 10 miles N.E. of Milton, 26.x.1957 (NSW 43113); *Helms s.n.*, Botany Bay, 1.xi.1901 (NSW 139089); *Maiden s.n.*, Wreck Bay, -.iii.1917 (NSW 139098).

QUEENSLAND: *Black 13819*, Stradbroke Is., 24.vii.1938 (BRI).

NEW ZEALAND: *Allan s.n.*, Chalky Inlet, Fiordland, 30.i.1946 (CHR 93152-93154); *Colenso 89*, N. Zealand, -.-.1847 (K); *Colenso 230*, N. Zealand, -.-.1847 (K); *Colenso 2047*, N. Zealand, s.dat. (K); *Sneddon s.n.*, Uawa R. estuary Tolaga Bay, East Cape, 9.xii.1967 (WELTU 7149).

b. ssp. **howense** Short, subspecies nova

?*Apium prostratum* Labill, ex Vent.: F. Muell., Fragm.Phyt.Austral.6(1871)148; Hemsl., Ann.Bot.10(1896)238; Maiden, Proc.Linn.Soc.N.S.W.23(1898)129; W. Oliver, Trans.-N.Z.Inst.49(1917)146.

Apium australe auct.non Pet-Thou.: Benth., Fl. Austral. 3(1867)372, p.p. (as to Macgillivray colln., Lord Howe Is.).

Folia umbellas compositas opposita (3.5)4-5(5.7) cm longa, foliola semper primaria, 5-7, divisa, segmentis primariis trifidis tripartitisve (1.0)1.1-2.5(3.6) mm latis proxime infra divisiones segmenta secundaria facientes, segmentis ultimis usque ad ordinem tertium, 37-66 per folium; *folia basalia* ut videtur simillima.

Holotypus (Fig. 10): *Chinnock s.n.*, Lord Howe Island, coastal cliff near jetty, growing on bare limestone, 27.xi.1968 (AD 97803258, ex WELTU 8113).

Isotypus: WELTU 8113.

Leaves opposite compound umbels (3.5)4-5(5.7) cm long; leaflets primary only, ca. 5-7, divided, with primary segments trifid to tripartite, (1.0)1.1-2.5(3.6) mm broad immediately below divisions forming secondary segments, ultimate segments up to tertiary order, 37-66 per leaf; *basal leaves* apparently identical to leaves opposite umbels. Fig. 10.

Distribution

The subspecies appears to be restricted to Lord Howe Island.

Ecology

Only coastal collections have been made of this subspecies.

Notes

1. The restricted distribution as well as the distinctive leaf have formed the basis for the recognition of this taxon as a subspecies of *A. prostratum.*

Specimens examined: all specimens, excluding types.

LORD HOWE ISLAND: *Green 1921*, Signal Point, on coral rocks just above splash zone, *Hoogland 8635*, Middle Beach area, 27.x.1963 (CANB); *Lind & Fullager s.n.*, Lord Howe Island, s.dat. (MEL); *McComish 40*, small herb growing a few feet above H.W. mark, -.x.1936 (K); *MacGillivray 714*, Lord Howe Island, banks by the seashore, .ix.1853, (K); *Mo(ire) s.n.*, Lord Howe Island, s.dat. (K).

c. ssp. **denticulatum** Short, subspecies nova

? *A. australe* auct.non Pet.-Thou.: Allan, Fl. N.Zeal. 1(1961)463, p.p. (possibly as to some Chatham Is. occurrences).

Folia umbellas opposita ca. 6 cm long; foliola semper primaria, 3-5, divisa, segmentis primariis denticulatis, segmentis ultimis usque ad ordinem tertium, ca. 50-80(120); *folia basalia* foliis umbellas oppositibus simillima, ca. 3-5(7) foliolatis.

Holotypus (Fig. 11): *Moar 1552,* Te Whanga Lagoon, Chatham Is., limestone rocks, 5.xi.1959 (CHR).

Leaves opposite umbels ca. 6 cm long; leaflers primary only, 3-5, divided, with primary segments with denticulate margins due to the large number of secondary and/or tertiary segments, ultimate segments up to tertiary order, ca. 50-80(120); *basal leaves* similar to leaves opposite umbels with ca. 3-5(7) leaflets. Fig. 11.

Distribution

This taxon appears to be restricted to Chatham Island.

Ecology

Moar's (*1552*) collection was recorded as growing in limestone rocks while Burke's collection (*WELTU 4003*) was found growing in sand on the shore of a lagoon.

Specimens examined: all specimens, excluding holotype.

CHATHAM ISLANDS: *Anon.,* Point Weeding, Chatham Is., 15.ii.1967 (CHR 176561); ? *Bell s.n.,* South East Island, Chatham Islands, .xii.1961 (CHR 159015); *Burke s.n.,* growing in sand on shore of lagoon, Chatham island, 1.iv.1967 (*WELTU 4003*); *Talbot s.n.,* Chatham island, -.ii.1968 (CHR 268957, 268958).

d. ssp. "**A**", ssp. not named

Leaves opposite umbels to 14.5 cm long; leaflets primary and secondary, ca. 9 in all, divided, with primary segments pinnatifid, narrow, ultimate segments up to quaternary order, greater than ca. 100-150 per leaf; *basal leaves* not seen. Fig. 12.

Distribution

This unnamed taxon has only been collected from the Porongorup Ranges, Western Australia.

Ecology

No information available.

Notes

1. This taxon may not belong to *A. prostratum.* For correct identification of *Apium* species it is desirable to view mature mericarps, but unfortunately the collection of this taxon entirely lacks fruit. However, inflorescence and floral characters that can be observed suggest that the affinities are with *A. prostratum.*

Specimens examined

WESTERN AUSTRALIA: *Anon. s.n.,* Porongorups, -.x.1867 (MEL 503681, MEL 503682, MEL 503694).

2. **Apium insulare** Short, species nova

Apium prostratum auct.-non Labill. ex Vent.: W.M. Curtis, Stud. Fl. Tasm. (1963)255, p.p.; Willis. Handb. Pl. Vict. 2(1973)490, p.p. *Apium australe* auct.-non Pet.-Thou.: Benth., Fl. Austral. 3(1867)374, p.p. (excl. *A. annuum* Short, e.g. *Anon.* MEL. 503676. *A. prostratum* Labill. ex Vent. as to MEL. collns.); F.M. Bail., Queensl. Fl. 2(1900)724, p.p.

Herba terrestris, biennis perennisve, glabra, erecta, caule ca. 50-70 cm alto, crasso, 0.8-1 cm diametro. *Folia umbellas compositas opposita* (4.4)6-12(16.7) cm longa; foliola primaria et saepe secundaria, omnino (3)5-7(9), crassa, late obovata in ambitu, divisa segmentis primaris usque quaternariis, segmentis ultimis acutis obtusisve, (22)50-250(300) per folium; *folia basalia* non vidi. *Umbellae compositae* semper pedunculatae; pedunculus (0.2)2-5(8.7) cm longus, (1)2-3(4) mm diametro; bracteae plerumque nullae, interdum una praesens; bracteolae semper

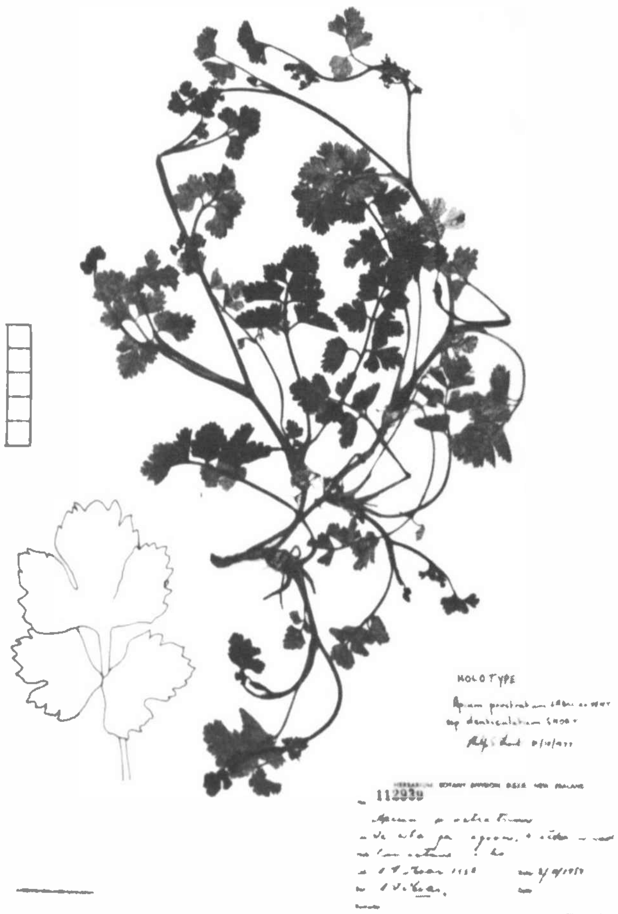


Fig. 11. *A prostratum* Labill. ex Vent. ssp. *denticulatum* Short Holotype (*Moar 1552*, CHR).



Fig. 12. *A. prostratum* Labill. ex Vent. ssp. 'A'. (*Anon.* MEL 503694).

nullae; radii (8)10-18(20) per pedunculum, (0.65)2-3(4.6) cm longi, 0.3-1 mm diametro; pedicelli ca. 15-25 per radium, (2)2.5-4(6.5) mm longi. *Petala* alba nervo medio luteo-brunneo, ovata, (0.75)0.85-1.0(1.1) mm longa, (0.6)0.8-0.9(1.0) mm lata, ad basem constricta, apice acuto. *Stamina* petala aequantia excedentiave, (0.9)1.0-1.1(1.2) mm longa; filamenta alba ± luteave; antherae albae ± luteave, 0.4 mm longae lataeque. *Ovarium* glabrum, stylopodio disciformi, stylo (0.6)0.7-0.8 mm longo, stylopodio ca. duplo longiore. *Schizocarpium* ovato-orbiculare orbiculareve, 1.5-2.7 mm longum, 1.2-2.5 mm latum; carpophorum brevissime bifidum; mericarpia in sectione radiali-longitudinali in pagine commissurali plana, costis prominentibus suberosis fere tecta, pariete seminis inter costos vix distinguibili. *Chromosomatum numerus* ignotus.

Holotypus (Fig. 13): *Mattingley s.n.*, Hogan Group, Bass St., 28.xi.1937 (MEL 503672).

Terrestrial, biennial or perennial *herb,* glabrous, erect, with stem ca. 50-70 cm tall, thick, 0.8-1 cm diameter. *Leaves opposite compound umbels* (4.4)6-12(16.7) cm long; leaflets primary and often secondary, (3)5-7(9) in all, thick, broadly obovate in outline, divided with primary up to quaternary segments, ultimate segments acute to obtuse, (22)50-250(300) per leaf; *basal leaves* not seen. *Compound umbels* consistently pedunculate; peduncle (0.2)2-5(8.7) cm long, (1)2-3(4) mm diameter; *bracts* generally absent, occasionally one present; bracteoles always absent; rays (8)10-18(20) per peduncle, (0.65)2-3(4.6) cm long, 0.3-1 mm diameter; pedicels ca. 15-25 per ray, (2)2.5-4(6.5) mm long. *Petals* white with yellow-brown mid vein, ovate, (0.75)0.85-1.0(1.1) mm long, (0.6)0.8-0.9(1.0) mm wide, constricted at base, apex acute. *Stamens* equal to or greater than the length of the petals, (0.9)1.0-1.1(1.2) mm long; filaments white to ± yellow; anthers white to ± yellow, 0.4 mm long, 0.4 mm wide; *ovary* glabrous; stylopodium disc-like; style (0.6)0.7-0.8 mm long, about twice the length of the stylopodium. *Schizocarp* ovate-orbicular to orbicular, 1.5-2.7 mm long, 1.2-2.5 mm broad; carpophore very shortly bifid; mericarps in radial longitudinal section flat on commissural surface, almost covered by prominent corky ribs, with seed wall barely apparent between ribs, transverse section not made (material inadequate). *Chromosome number* unknown. Fig. 13.

Distribution (Fig. 7)

A. insulare has only been collected from Lord Howe Island and islands in Bass Strait.

Notes

1. It is desirable to see more collections of *A. insulare* as at present the full range of variation exhibited by characters is unknown.

2. *A. insulare* exhibits the erect, robust stem of *A. australe* (Fig. 6) but the latter taxon can be readily distinguished from *A. insulare* by the presence of the more or less lanceolate leaflets and segments of the leaves surrounding the umbels.

Specimens examined: all specimens, excluding holotype.

VICTORIA: *Brown s.n.*, Bass St., s.dat. (MEL 503673).

LORD HOWE ISLAND: *Fullager & Lind 81*, Lord Howe Island, s.dat. (MEL); ? *Fullager & Lind s.n.*, Lord Howe Island, s.dat. (MEL 503678); *Green 1962*, Salmon Beach, 2.ix.1971 (K).

3. **Apium annuum** Short, species nova

Apium prostratum auct. non Labill, ex Vent.: F. Muell., First Syst. Census Austral. Pl. 2(1882)63, p.p.; F. Muell., Key Syst. Vict. Pl. 2(1885)26, p.p. F. Muell., Key Syst. Vict. Pl. 1(1887/8)269, p.p.; F. Muell., Sec. Syst. Census Austral. Pl. (1889)108, p.p.; Eichler, Suppl. to Black's Fl. S.Austral. (1965)252, p.p.; Willis, Handb. Pl. Vict. 2(1973)490, p.p.

Apium australe auct. non Pet.-Thou.: Benth., Fl. Austral. 3(1867)372, p.p.; F.M. Bail., Queensl. Fl. (1900)724, p.p. ?; Black, Fl. S.Austral. 1 ed. (1926)444, 2 ed. (1952)662, p.p.; Ewart, Fl. Vict. (1930)906, ? p.p.

Herba terrestris, annua, glabra, caule minuto vel erecto ramificantique, (.13)3-10(18.5) cm alta. *Folia umbellas compositas opposita* late obovata usque late ovata in ambitu, (0.5)2-4(10) cm longa; foliola semper primaria, (1)3-5(7), late elliptica usque late obovata, segmentis semper primariis, plerumque secundariis, interdum tertiis, raro quaternariis, segmentis ultimis ovatis acutisve, (3)7-30(60) per folium; *folia basalia* foliis in caulibus plantae erectae



Fig. 13. *A. insulare* Short Holotype (*Mattingley s.n.*, MEL 503672).



Fig. 14. *A. annuum* Short Holotype (*Short 715*, AD).

similaria sed aliquantum minus divisa. *Umbellae compositae* plerumque sessiles, raro pedunculatae; pedunculus abi praesens (1.1)1.5-4(6.5) cm longus; bracteae bracteolaeque semper nullae; radii (1)2-4(5) per inflorescentiam, (0.67)1-4(7.8) cm longi; pedicelli (2)4-10(15) per radium, 0.1-4.5(5.2) mm longi. *Petala* alba nervo medio luteo-brunneo, ovata, 0.6-0.75 mm longa, (0.35)0.4-0.5 mm lata, ad basem constricta, apice acuto. *Stamina* longitudine ¾ petalorum partes aequantia, (0.35)0.4-0.5(0.6) mm longa; filamenta alba ± luteave; antherae albae, ± luteae purpureaeve, 0.15-0.2 mm longae, 0.15-0.25 mm latae. *Ovarium* glabrum, stylopodio disciformi, stylo 0.15-0.25 mm longo, altitudine stylopodium circa aequanti. *Schizocarpium* ovato-orbiculare usque orbiculare, 1.1-2.7 mm longum, 1.1-3 mm latum; carpophorum brevissime bifidum; mericarpia in sectione radiali-longitudinali in pagine commissurali concava, in sectione transversali hexagona, costis prominentibus, latitudine spatia ad parietem seminis circa aequantibus, vittis magnis, in saptiis solitariis, in commissura duobus. *Chromosomatum numerus:* n = 11.

Holotypus (Fig. 14): *Short 715,* Yorke Peninsula, ca. 8.5 km S. of Corny Point Lighthouse on coast road to Gleeson's Landing, (34° 58′ S, 136° 58′ E), 9.x.1977 (AD, fl., immature fr.).
Isotypi: AD, CANB, K, PERTH (fl., immature fr.).
Topotypi: Short 205, 13.iii.1965 (AD); *Short 206,* 13.iii.1976 (AD, CANB, K, PERTH, mature fr.).

Terrestrial, annual *herb;* glabrous, stem minute or erect and branching, (1.3)3-10(18.5) cm tall. *Leaves opposite umbels* broadly obovate to broadly ovate in outline, (0.5)2-4(10) cm long; leaflets always primary, (1)3-5(7), broadly elliptic or obovate, with always primary, usually secondary, sometimes tertiary, rarely quaternary segments, ultimate segments ovate or acute, (3)7-30(60) per leaf; *basal leaves* similar to leaves on stem of erect forms but usually somewhat less divided. *Compound umbels* usually sessile, rarely pedunculate; peduncle when present (1.1)1.5-4(6.5) cm long; bracts and bracteoles always absent; rays (1)2-4(5) per inflorescence, (0.67)1-4(7.8) cm long; pedicels (2)4-10(15) per ray, 0.1-4.5(5.2) mm long. *Petals* white with yellow-brown midvein, ovate, 0.6-0.75 mm long, (0.35)0.4-0.5 mm wide, constricted at base, apex acute. *Stamens* approximately ¾ length of the petsls, (0.35)0.4-0.5(0.6) mm long; filaments white or ± yellow; anthers white, ± yellow or purple, 0.15)0.2 mm long, 0.15-0.25 mm wide. *Ovary* glabrous; stylopodium disc-like; style 0.15-0.25 mm long, about equalling height of stylopodium. *Schizocarp* ovate-orbicular to orbicular, 1.1-2.7 mm long, 1.1-3 mm broad (lower measurements probably pertain to immature fruit); carpophore very shortly bifid; mericarps in radial longitudinal section concave on commissural surface, hexagonal in transection, ribs prominent, with the width of the intervals at the seed face approximately equal to the width of the ribs, vittae large, solitary in the intervals, 2 on the commissure. *Chromosome number:* n = 11. Figs: 3-5, 14.

Distribution (Fig. 7)

The species is common in inland and coastal situations in Western Australia, South Australia and Victoria.

Ecology

A. annuum occupies a wide range of habitats, being found in coastal foreshore situations and inland situations where it may be found in *Eucalyptus camaldulensis* and *Casuarina* communities or with *Arthrocnemum* around the margin of salty depressions.

It flowers in late spring and early summer.

Notes

1. Using Wolff's (1927) key to the sections of *Apium, A. annuum* would be placed in his section *Ciclospermum* (Lag.) Wolff or, as followed here, the genus *Ciclospermum* Lag. This is a result of the sectional divisions in Wolff's key being based on, among other things, the life-span of the species. Under this scheme all annuals are placed in *Ciclospermum.* However, *A. annuum* differs from the members of *Ciclospermum* in many diagnostic characters and clearly belongs to *Apium* sect. *Apium.* Table 2 summarizes the characteristics of the genus *Ciclospermum, Apium* sect. *Apium* and *A. annuum.*

Table 2: The characteristics of *Apium* sect. *Apium*, *A. annuum* Short and *Ciclospermum* Lag.

	Sect. Apium	A. annuum	Genus Ciclospermum
Life-span	biennial or perennial	annual	annual
Cotyledons	round type	round type	long type
Pollen	oval	oval?	sub-rhomboidal
Fruit	glabrous	glabrous	glabrous or setulose
Chromosomes	n = 11	n = 11	n = 7

The pollen and cotyledon characters included in the table have been given much weight by Cerceau-Larrival (1964, 1971) in the recognition of tribes in the Apioideae. She regards the genus *Ciclospermum* to be far removed from the genus *Apium*.

2. *Ciclospermum leptophyllum* (Pers.) Sprague can be easily distinguished from *Apium annuum*, and indeed all Australasian species of *Apium*, on vegetative characters alone. This species is an erect annual about 40-60 cm high and possesses leaves which are divided into many filiform segments.

3. The collection *Eichler 17781* (15.xii.1963 ca. 12 km north of Kingston, South East, South Australia AD) appears to contain mature plants nearly all of which have lost their leaves. The plants are little more than 5 cm tall and many have pedunculate compound umbels. The apparently mature mericarps appear to differ from those of *A. annuum* in having small acute ribs (Fig. 5).

Specimens examined: selection only.

WESTERN AUSTRALIA: *Royce 8792*, East of Esperance, 22.x.1969 (PERTH); *Royce 9956*, Cape Arid National Park, 1.xii.1971 (PERTH); *Short 673*, salty depression 1 km E. of Wave Rock, Hyden, 25.ix.1977 (AD); *Willis s.n.*, Figure-of Eight Island, Recherche Archipelago, 7.xi.1950 (MEL 503670); *Wilson s.n.*, Fitzgerald R. Reserve ca. 6 km W. of Middle Mt Barren, 6.x.1970 (PERTH).

SOUTH AUSTRALIA: *Ising s.n.*, Granite Island, 6.x.1968 (AD 96804027); *Orchard 2276*, Gawler Ranges, Yandinga Gorge, 26.ix.1969 (AD); *Wace 223*, Dog Island, Isles of St. Francis, Nuyts Archipelago, 3.x.1972 (AD); *Weber 4367*, Pondalowie Bay, 13.x.1974 (AD); *Wheeler 1404*, Remarkable Rocks at Kirkpatrick Point, Kangaroo Island (AD).

VICTORIA: *Mueller s.n.*, Hopkins River, s.dat. (D); *Walter s.n.*, Wimmera District, -.x.1900 (NSW 139060).

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Index to Scientific Names

Names

New names are in bold type. Synonyms and misapplied names are in italics.

Page Numbers

Page numbers in bold type refer to the main taxonomic treatment. Page numbers asterisked refer to figures and maps.